FOR CONTRACT NO.: 11-081644

INFORMATION HANDOUT

MATERIALS INFORMATION

FOUNDATION AND SEISMIC RECOMMENDATIONS FOR BONITA ROAD UNDERCROSSING (WIDEN), BR. NO 57-637L, DATED APRIL 30, 2008

FOUNDATION REVIEW FOR BONITA UNDERCROSSING, BR. NO. 57-637L, DATED DECEMBER 5, 2008

WATER AVALIABILTY LETTER, DATED SEPTEMBER8, 2008

ROUTE: 11-SD-805-7.6/9.2

State of California Business, Transportation and Housing Agency

Flex your power!
Be energy efficient!

Memorandum

To: MR. MATT HOLM, CHIEF
DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES MS#9-3/3G
OFFICE OF STRUCTURE DESIGN – SOUTH 2

Date: May 23, 2008

File: 11-SD-805-PM 7.8
11-081641

Attention: Mr. Clarence Hänsel

Bonita Road UC (Widen)
Br. No. 57-637L

From: DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES - MS #5
OFFICE OF GEOTECHNICAL DESIGN SOUTH-2

Subject: Foundation and Seismic Design Recommendations

Introduction

This report presents final foundation and seismic design recommendations for the proposed widening of the Bonita Road UC (Br. No. 57-637L). The foundation and seismic recommendations contained in this report are based on our review of available General Plan, Structures Loads dated April 23, 2008, Foundation Plan dated April 23, 2008, Subsurface exploration (1968, 2008), As-Built records (1975), Geotechnical Log of Test Borings (1968), and other information from Caltrans' Bridge Inspection Records Information Systems (BIRIS). Elevations referenced in this report are based on the NGVD 1988 vertical datum.

Project/Site Description

The Bonita Road U.C. is located approximately at Post Mile 7.8 on Route 805, in San Diego County. The existing Bonita Road U.C. is a continuous three-span Cast-In-Place / Prestress (CIP/PS) box girder (8 cell) on reinforced concrete open end diaphragm abutments (abutments 1 and 4) and 3-column bents (Bents 2 and 3), all founded on 70 ton (12 inches x 12 inches) precast prestressed concrete driven piles. The bottom of footing and specified tip elevations are listed in Tables 1 and 2, respectively.

Table 1: Approximate bottom of footing Elevations for existing left bridge

Location	Bottom of footing (pile cap) Elevations in feet
Abutment 1	sloping away from existing "A" line 57.0 to 53.5
Bents 2 and 3	35.5
Abutment 4	sloping away from existing "A" line 54.2 to 50.6

Table 2: Approximate specified Tip Elevation for Abutments, Bents and Wingwalls for the existing left bridge

Class 70C Driven Piles	
Location	Elevation (feet)
Along centerline Abutment 1, from right edge of the deck to left edge of the deck	varies from +35 to +15
Bent 2	10
Bent 3	10
Abutment 4	5
Wingwall Class 45-1C Driven Piles	
Location	Elevation (feet)
Abutment 1 left wing wall	20
Abutment 1 right wingwall	40
Abutment 4 all wingwalls	10

The existing Bonita Road U.C. was built in 1975. The length of the bridge is approximately 300 feet. The wing walls are supported on class 45-1C piles. Based upon the requesting letter, the proposed project involves APS-28 ft widening. (Alternative 2).

Geotechnical Investigation

The Office of Geotechnical Design South-2 performed subsurface geotechnical investigations from April 8 through April 9, 2008. The subsurface geotechnical exploration included drilling two mud rotary wash borings. The maximum depth of the investigation was 100.0 feet (elevation -56.0 feet) below the existing ground surface. Bedrock was not encountered during this investigation. The test borings information in this report including stations, top of borehole elevations, depths, and groundwater level measurements is summarized in Table 3.

Table 3 Boring Data

Boring Number	Station (feet)	Top of Borehole Elevation (feet)	Exploration Depth (feet)	Groundwater Surface Elevation (feet)
R-08-001	442+70	43.78	80.0	29.78
R-08-002	444+40	43.94	100.0	Not measured

The geotechnical subsurface investigation for the existing Bonita Road U.C. was conducted during March 1968. This investigation consisted of two 3-inch rotary sample borings and seven 2 ¼ inch cone penetrometer tests. The maximum depth of the investigation was 43 feet (elevation - 6 feet) below the existing ground surface.

Laboratory Testing

Selected soil samples were tested to evaluate corrosion potential. All tests were performed in accordance with American Society for Testing and Material (ASTM) standards or California Testing Methods (CTMs).

Site Geology and Subsurface Conditions

The subsurface characterization of the site is based on borings drilled in 2008. The bridge site is underlain by deposits of loose to very dense silty sands and fine sands with clay binder. These deposits continue to elevation -56. Bedrock was not encountered during this investigation.

Groundwater

During the recent (April 2008) subsurface geotechnical investigation, the groundwater was measured at elevation 29.78 feet (14 feet below existing ground surface at bent 2 location) in Boring B08-1. The groundwater elevation may fluctuate due to seasonal variation. Groundwater was encountered at elevation varying from 28.4 ft to 31.8 ft during the March 1968 investigation.

Scour Evaluation

Since bridge supports are not located within any unlined drainage or stream channel, scour is not expected to be a concern.

Liquefaction Potential Evaluation

Based on the field data from recent field investigation, the subject site has a low liquefaction potential.

Seismic Data Evaluation

The controlling fault for this site is the Newport-Inglewood-Rose Canyon/East (NIE, Strike-slip). The bridge site is located approximately 3.5 miles (5.7 kilometers) northeast of the NIE fault. The NIE fault is capable of generating a Maximum Credible Earthquake Moment Magnitude, Mw = 7. The corresponding Peak Bedrock Acceleration (PBA) at this site is estimated to be about 0.5g. Based on the site geology, the corresponding Peak Ground Acceleration (PGA) is 0.5g.

The faulting and seismicity information provided above is based on the 1996 Caltrans California Seismic Hazard Map and 1997 Geomatrix Attenuation Relationship. The site is not considered prone to surface rupture due to fault movement since there are no known faults projecting towards or passing through the project site.

Recommended ARS

For seismic design purposes, the soil profile at this site is classified as Type D as defined in Table B.1 of the Caltrans Seismic Design Criteria (SDC, 2006). The recommended ARS was obtained by modifying the ARS shown in Figure B.8 of the SDC corresponding to a PBA of 0.5g. The modifications included a 20 percent increase in the spectral accelerations for periods T>1.0 seconds. No modification was performed for periods T<0.5 seconds. A linear interpolation was used to obtain spectral accelerations for 0.5<T<1.0 seconds. The recommended Acceleration Response Spectrum (ARS) is attached.

Corrosion Evaluation

Representative soil samples collected from the current field investigation were tested to determine the corrosion potential of the in-situ soils. The results of these tests are presented in Table 4. Caltrans corrosion criteria currently defines a corrosive area as an area where the soil and water have a minimum resistivity of less than 1000 ohm-cm, and either contains more than 500 parts per million (ppm) of chloride, more than 2000 ppm of sulfate, or has a pH 5.5 or less.

Table 4. Summary of Corrosion Tests

Boring No.	Top of Borehole Elevation (feet)	Sample Depth (feet)	Soil Type	Minimum Resistivity (ohm-cm)	pH	Sulfate Content (ppm)	Chloride Content (ppm)
R-08-001	43.78	0-6	SM	1624	8.21		
		11-16	SM	814	7.76	300	200
		20-25	SP	848	7.69	300	100
		30-35	SC/MH	1030	7.70		
		45-50	SP	1293	7.81		
		70-75	ML	889	7.71	260	480
R-08-002	43.94	0-5	ML/SM	1374	7.92		
		10-15	SP	1485	8.23		
		25-30	SM	1153	7.75		
		55-60	ML	1158	7.96		
		91-100	ML	1271	8.14		

The laboratory test results indicate that the streambed alluvium underlying the site will be non-corrosive to the proposed pile foundations. Standard construction methods may be employed.

Settlement

Subsurface soils are composed of predominantly granular material. Therefore, long-term consolidation settlement is not expected. Based on our calculations, maximum estimated settlement at the support locations is less than 1-inch.

Foundation Recommendations

The following recommendations are for the proposed widening of Bonita Road Undercrossing (Bridge No. 57-637L). At all support locations, driven H- Piles (HP 12x84) are recommended for all supports. The specified pile tip elevations are listed below in Tables 5 and 6. The ultimate geotechnical capacity of the piles will equal or exceed the required foundation design loads, which were provided by the structure designers at each support locations. The three controlling LRFD limit states loads (Service-I Limit State, Strength Limit State, and Extreme Event Limit State) loads are shown in the tables 7 and 8.

Table 5. Foundation Recommendations for Abutments

Abutment Foundations Design Recommendations									
Support	Pile	Cut-off Elevation (ft)	LRFD Service-I Limit State Load (kips) per Support		LRFD Service-I Limit State Total Load (kips) per Pile (Compression)	Nominal Resistance (kips)	Design Tip Elevations (ft)	Specified Tip Elevation (ft)	Nominal Driving Resistance Required (kips)
			Total	Permanent					
Abut. 1	HP 12x84	53.3	1050	640	150	300	12(a)	12	300
Abut. 4	HP 12x84	50.2	1050	725	150	300	12(a)	12	300

Notes:

1) *Design tip elevations are controlled by: (a) Compression, (b) Tension (c) Settlement, (d) Lateral Load, respectively.*
2) *The specified tip elevation shall not be raised above the design tip elevations for tension, lateral, and tolerable settlement.*
3) *The nominal driving resistance required is equal to the nominal resistance needed to support the factored load plus driving resistance from the unsuitable penetrated soil layers (very soft, liquefiable, scourable, etc.), if any, which do not contribute to the design resistance.*

Table 6. Foundation Recommendations for Bents

Bent Foundations Design Recommendations											
Support Location	Pile Type	Cut-off - Elevation (ft)	Service-I Limit State Load per Support (kips)	Total Permissible Support Settlement (inches)	Required Factored Nominal Resistance (kips)				Design Tip Elevations (ft)	Specified Tip Elevation (ft)	Nominal Driving Resistance Required (kips)
					Strength Limit		Extreme Event				
					Comp. (φ=0.7)	Tension (φ=0.7)	Comp. (φ=1)	Tension (φ=1)			
Bents 2 and 3	HP 12x84	38.2	60	1	120	0	200	140	0 (b-I)	0	200

Notes:

1) *Design tip elevations are controlled by: (a-I) Compression (Strength Limit), (b-I) Tension (Strength Limit), (a-II) Compression (Extreme Event), (b-II) Tension (Extreme Event), (c) Settlement, (d) Lateral Load*
2) *The specified tip elevation shall not be raised above the design tip elevations for tension, lateral, and tolerable settlement.*
3) *The nominal driving resistance required is equal to the nominal resistance needed to support the factored load plus driving resistance from the unsuitable penetrated soil layers (very soft, liquefiable, scourable, etc.), if any, which do not contribute to the design resistance.*

Pile Data Table 7.

Foundation Design Data Sheet								
Support No.	Design Method	Pile Type	Finished Grade Elevation (ft)	Cut-off Elevation (ft)	Pile Cap Size (ft)		Permissible Settlement under Service Load (in)*	Number of Piles per Support
					B	L		
Abut 1	WSD	HP 12x84	56.7	53.3	7.5	41.2	1" or 2"	7
Bent 2	LRFD	HP 12x84	44.0	38.2	13.0	24.0	1" or 2"	40
Bent 3	LRFD	HP 12x84	44.0	38.2	13.0	24.0	1" or 2"	40
Abut 3	WSD	HP 12x84	57.8	50.2	7.5	47.4	1" or 2"	7

- *Based on CALTRANS' current practice, the total permissible settlement is one inch for structures with continuous spans or multi-column bents, and two inches for simple span structures.*

Pile Data Table 8.

Foundation Design Loads												
Support No.	Service-I Limit State (kips)			Strength Limit State (Controlling Group, kips)				Extreme Event Limit State (Controlling Group, kips)			
	Total Load		Permanent Loads	Compression		Tension		Compression		Tension	
	Per Support	Max. Per Pile	Per Support	Per Support	Max. Per Pile	Per Support	Max. Per Pile	Per Support	Max. Per Pile	Per Support	Max. Per Pile
Abut 1	1050	150	640	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bent 2	1650	60	1380	2600	120	0	0	1230	200	0	140
Bent 3	1650	60	1380	2600	120	0	0	1230	200	0	140
Abut 4	1050	150	725	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

General Notes:

1. The structural engineer shall show the pile data table with the specified pile tip elevations on the foundation plan.

2. Support locations are to be plotted on the Log of Test Borings, in plan view, as stated in "Memos to Designers" 4-2. The plotting of the support locations should be made prior to the foundation review.

Construction Considerations

1. Piles shall be driven at least to the specified tip elevation and the value should be checked with the pile-driving formula given in Section 49-1.08 of the State of California Department of Transportation (Caltrans) Standard Specifications (2006). If the specified tip elevation is reached without achieving the nominal resistance, pile driving should continue till bearing is attained.
2. Our driveability study at bents 2 and 3 showed that the Delmag hammers D 15, D 16-32, D 22-02, or FEC hammer FEC 1500 or Mitsubis hammer MH 15 would be capable to drive the proposed HP 12x84 piles without overstressing the piles.
3. Pile driving shall conform to Section 49-1.05 of Caltrans Standard Specifications May 2006.
4. If required, splicing shall conform to Caltrans Standard Specifications May 2006.
5. The pile driving acceptance criteria shall conform to Section 49-1.08 of Caltrans Standard Specifications May 2006.

The recommendations contained in this report are based on specific project information regarding design loads and structure locations that has been provided by Office of Bridge Design South, Branch 12. If any conceptual changes are made during final project design, the Office of Geotechnical Design South-2, should review those changes to determine if the foundation recommendations provided in this report are still applicable. Any questions regarding the above recommendations should be directed to attention of Segaran Logeswaran (916) 227-4516 or Angel Perez-Cobo (916) 227-7167, Office of Geotechnical Design South-2.

Prepared by: Date: 05/23/08

REGISTERED PROFESSIONAL ENGINEER
SEGARAN LOGESWARAN
No. C70280
Exp. 09/08
CIVIL
STATE OF CALIFORNIA

Segaran Logeswaran
Transportation Engineer

Supervised by: Date:

Angel Perez-Cobo
Senior Transportation Engineer
Office of Geotechnical Design South-2

Attachments: ARS Curve
Report – Driveability Study

c: Project File
AWardak
RE Pending File
Specs and Estimates
Project File

FOUNDATION REVIEW

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

To: Structure Design
1. ~~Preliminary Report~~
2. R.E. Pending File
3. ~~Specifications & Estimates~~
4. File

Geotechnical Services
1. GS (Sacramento)
2. GS

Date: 12/5/08

Bonita Rd U.C
Structure Name

11 - SD - 805 - 7.7/8.5
District County Route Post Km ~~Km~~ M.

District Project Development
District Project Engineer

11-081641 57-0637L
E.A. Number Structure Number

Foundation Report By: S. Logeswaran Dated: 4/30/08

Reviewed By: C. Hensel (OSD) R. Price (GS)

General Plan Dated: 11/24/08 Foundation Plan Dated: 11/24/08

☒ No changes. ☐ The following changes are necessary.

HP 14X89 piles may be substituted for the recommended HP 12X84.

FOUNDATION CHECKLIST

- ✓ Pile Types and Design Loads
- ✓ Pile Lengths
- ✓ Predrilling
- ✓ Pile Load Test
- ✓ Substitution of H Piles For Concrete Piles ☐ Yes ☐ No
- ✓ Footing Elevations, Design Loads, and Locations
- ✓ Seismic Data
- ✓ Location of Adjacent Structures and Utilities
- ✓ Stability of Cuts or Fills
- ✓ Fill Time Delay
- ✓ Effect of Fills on Abutments and Bents
- ✓ LOTB's
- ✓ Fill Surcharge
- ✓ Approach Paving Slabs
- ✓ Scour
- ✓ Ground Water
- ✓ Tremie Seals/Type D Excavation

Clarence M Hensel 252
Office of Structure Design Branch No.

Geotechnical Services

Rev. 10/02

SWEETWATER AUTHORITY

505 GARRETT AVENUE
POST OFFICE BOX 2328
CHULA VISTA, CALIFORNIA 91912-2328
(619) 420-1413
FAX (619) 425-7469
http://www.sweetwater.org

September 8, 2008

Mr. C.W. Davis
State of California
Department of Transportation
4050 Taylor Street
San Diego, CA 92110

Subject: WATER AVAILABILITY
SWA FILE: ST. IMP. 08-13

Dear Mr. Davis:

Sweetwater Authority (Authority) serves the area of the I-805 southbound auxiliary lane north of H Street to State Route 54. The Authority currently provides water to Caltrans through two services on the west side of I-805 at Bonita Road, two services on the east side of I-805 at Hilltop Drive north of D Street, and two services on the south side of State Route 54 at Reo Drive. The Authority is able to provide 4,000 to 8,000 gallons of water per day, as requested.

If you have any questions, please contact Mr. Russell Collins at (619) 409-6754, or rcollins@sweetwater.org.

Sincerely,

SWEETWATER AUTHORITY

Hector Martinez
Engineering Manager

HM:RC:vls

I:\engr\St Imp\08-13 - Caltrans I-805 Auxiliary Lane\Cor\Ltr - Water Avail - 9-8-08.doc